YESIN, O.A., CHECHULIN, V.A.

[redacted]

"Studies on Cathode Process Occuring During Slags Electrolysis,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

YESIN, O.A., LEPINSKIKH, B.M.

"Studies on Electric Conductivity of Systems: $FeO-Fe_2O_3-P_2O_5$ and [illegible]-$CaO-P_2O_5$,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov [illegible] Metallurgy, Moscow, July 1-6, 1957

YESIN, O.A., ZYAZEV, V.L.

"Electric Conductivity of Vanadium Slags,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

YESIN, O.A., MUSIKHIN, V.I.

"EMF and Polarization in Titanium Slags,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

YESIN, OA., SHURYGIN, P.M.,

"EMF in Slags at Different Temperatures,"
lecture given at the Fourth Conference on Steelmaking, AA. Baikov Institute of Metallurgy, Moscow, July 1-6, 1957

YESIN, O.A., NIKITIN, Yu.P.

"The Double Electric Layer Capacity on the Metal-Slag Boundary," lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Mosocwo, July 1-6, 1957

YESIN, O.A.

"Electrochemistry of Liquid Slags,"
lecture given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metallurgy, Moscow, July 1-6, 1 57

YESIN, O.A., POPEL, S.I., BRATCHKOV, S.G., NAZUMOV, V.N., PLOTNIKOV, I.M.

"Electrochemical Desuphurization of Steel in Induction Furnace,"
lectute given at the Fourth Conference on Steelmaking, A.A. Baikov Institute of Metaallurgy, Moscow, July 1-6, 1957

YESIN, O. A.

137-1958-2-2346

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 20 (USSR)

AUTHORS: Yesin, O.A., Vatolin, N.A.

TITLE: A Study of the Physicochemical Properties of Molten Ferroalloys by Means of Electromotive Forces (Izucheniye fiziko-khimicheskikh svoystv zhidkikh ferrosplavov metodom elektrodvizhushchikh sil)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 263-271. Diskus., pp 332-334

ABSTRACT: Measurements were made of the e.m.f. in galvanic cells at 1250-1470°. Serving as electrodes in the cells were the molten alloys Fe-P-C, Fe-Cr-C, Fe-Si-Cr-C, Fe-Mn-C, Si-Mn-C, Fe-S-C, and as the electrolyte a synthetic slag to which oxides of the element being investigated had been added. It was found that the e.m.f. changed in accordance with an established law as a function of the concentration of the alloy components. From the e.m.f. data it could be determined how active the P, Cr, Si, Mn, S, and V were in Fe alloys wherein the Fe was saturated with C. The breaks in the isothermal e.m.f. curves indicated that in molten alloys based on Fe slightly -dissociated compounds Fe_2P, (Fe, Cr) Si, (Fe, Cr) Si_2, Mn_2Si, and MnSi were possible. The

Card 1/2

137-1958-2-2346

A Study of the Physicochemical Properties of Molten Ferroalloys (cont.)

molten alloys Fe-Cr-C and Fe-Mn-C deviate positively from the ideal solutions and obey the law of semiregularity.

B.L.

1. Alloys--Molten--Properties--Theory

Card 2/2

SOV-137-59-2-2345

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 2, p 20 (USSR)

AUTHORS: Yesin, O. A., Shikhov, V. N.

TITLE: The Kinetics of Dephosphorization and Desulfurization of Metal by Slag (Kinetika obesfosforivaniya i obesserivaniya metalla shlakom)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 296-303. Diskus. pp 332-334

ABSTRACT: The authors studied the kinetics of desulfurization and dephosphorization of molten Fe by 2- and 3-component synthetic slags in the 1550-1720°C range. Radioactive isotopes P^{32} and S^{35} were used for measuring the S and P. The effect of the magnitude of the phase boundary surface, the depth of the slag layer, the initial [P], and the composition of the slag on the rate of passing of P into the slag was established. The order of either the direct or the reverse dephosphorization reaction is close to two. The kinetics of the reaction of dephosphorization of Fe are determined by the rate of the chemical act of the passing of P through the metal-slag boundary; the dephosphorization process passes through several stages with formation of intermediate compounds. In the study of desulfurizing of Fe with neutral and basic slags

Card 1/2

SOV/137-59-2-2365

The Kinetics of Dephosphorization and Desulfurization of Metal by Slag

it was established that the rate of the reaction proceeds according to the following equation: $[S]_{met} + (O^{2-})_{sl} \rightleftarrows [O]_{met} + (S^{2-})_{sl}$ and is limited by the [rate of] diffusion of S in the slag. The reaction is of the first order. The reaction of desulfurization of Fe by an acid slag has a fractional order and proceeds according to the following equation: $[S]_{met} + [Fe]_{met} \rightleftarrows (Fe^{2-})_{sl} + (S^{2-})_{sl}$, i.e., it is accompanied by simultaneous transfer of S and Fe into the slag. The limiting stage of this reaction is the migration of ions of S and Fe through the phase boundary.

I K

Card 2/2

YESIN, O.A.

137-1958-2-2347

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 20 (USSR)

AUTHORS: Yesin, O.A., Lepinskiy, B.M.

TITLE: Investigation of the Properties of a Molten Slag by Means of an Electromotive-Force Method (Issledovaniye svoystv zhidkogo shlaka metodom elektrodvizhushchikh sil)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 438-445. Diskus. pp 505-512

AESTRACT: At 1300-1500° measurements were made of the e.m.f. of galvanic cells composed of the molten slags $CaO-MgO-Al_2O_3-SiO_2$, Na_2O-SiO_2, $FeO-SiO_2$ or $FeO-TiO_2$ with an oxygen electrode of solid MgO or C. From the nature of the e.m.f.--composition curves it was possible to confirm the existence in the molten slags of the anions SiO_4^{4-}, $(SiO_3^{2-})_n(Si_2O_5^{2-})_m$, $Al_3O_7^{5-}$, $Al_2SiO_7^{4-}$, TiO_4^{4-}, and $(TiO_3^{2-})_n$. An attempt was made to use the e.m.f. method to keep track of the composition of the molten slag.

Card 1/1 B.L.

1. Slags--Molten--Properties--Analysis

YESIN, A.O.

137-1958-2-2348

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 20 (USSR)

AUTHORS: Yesin, A.O., Nikitin, Yu.P.

TITLE: Electrocapillary Phenomena in a Metal-Slag System (Elektrokapillyarnyye yavleniya v sisteme metall-shlak)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 446-452, Diskus. pp 505-512

ABSTRACT: A description is given of methods of studying electrocapillary phenomena in a metal-slag system at temperatures of 1320-1500°. Such phenomena were discovered in Fe-C and Fe-P alloys in contact with synthetic slags containing Ca, Si, Al, and Na oxides. It was found that the surface of the alloys, when the latter were in contact with the slags, bore a negative electric charge. The results obtained made it possible to explain why the exchange of CaO for NaO_2 had more of an effect on the interphase balance of the metal than did the exchange of Al_2O_3 for SiO_2. Surface activity on the part of the Na ions was noted in the systems studied. It was found that the adsorption of C on the surface of the metal decreased as the negative potential of the metal increased. An explanation is given of the influence of the polarity and composition of the

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137-1958-2-2348

Electrocapillary Phenomena in a Metal-Slag System

electrode coating on the size of the drops that form when ferrous metals are welded with direct current.

Yu.N.

1. Slags—Phenomena 2. Slags—Temperature effects

Card 2/2

YESIN, O. A.

137-1958-2-2352

Translation from Referativnyy zhurnal, Metallurgiya, 1958, Nr 2, p 21 (USSR)

AUTHORS: Shurygin, P.M., Yesin, O.A.

TITLE: The Electrolysis of Ferruginous Slags (Elektroliz zhelezistykh shlakov)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 464-468. Diskus. pp 505-512

ABSTRACT: Methods are described for electrolyzing ferruginous slags in crucibles of fused magnesia at temperatures of 1300-1400°. A drop of molten Au was used as cathode, because Au dissolved the precipitating Fe, eliminating thereby the possibility of short circuits between the electrodes and of metal losses through involvement of the metal in the slag. It was noted that even in the absence of any current some of the Fe migrated to the Au, which indicated the presence of Fe in the slag not only in the form of ions but in a metallic form as well. The current efficiency during electrolysis went as high as 82.3%. Increasing the concentration of Fe^{3+} ions reduced the current efficiency. This was accounted for by the fact that, aside from the discharge of Fe ions, an overcharging of Fe^{3+} ions to Fe^{2+} was occurring at the cathode. It

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137-1958-2-2352

The Electrolysis of Ferruginous Slags

was noted that during electrolysis of the ferruginous slags the influence of the electronic conductivity had to be taken into account.

Yu.N.

1. Slags--Electrolysis 2. Slags--Conductivity

Card 2/2

YESIN, O. A.

137-1958-2-2361

Translation from: Referativnyy zhurnal, Metallurgiya, 1958. Nr 2, p 22 (USSR)

AUTHORS: Popel', S.I., Yesin, O.A.

TITLE: The Surface Tension and Densities of the Simplest Oxide Systems (Poverkhnostnoye natyazheniye i plotnosti prosteyshikh oksidnykh sistem)

PERIODICAL: V sb.: Fiz.-khim. osnovy proiz-va stali. Moscow, AN SSSR, 1957, pp 497-504. Diskus., pp 505-512

ABSTRACT: The surface tension σ of molten oxides was measured by the value of the maximum pressure in the bubbles. This was the method used to determine the densities of the silicate melts. The experiments were carried out at temperatures of 1340°-1400°. The crucibles, capillaries, and tubes were prepared from Fe. N_2 served as the working gas. The surface tension of FeO with a 6.3% Fe_2O_3 content was 590 ergs/cm^2. When the Fe_2O_3 and SiO_2 contents were increased, the surface tension declined evenly, reaching 400 ergs/cm^2 as the SiO_2 and Fe_2O_3 contents reached 30.5% and 4.8%, respectively. The density of FeO at 1400° equaled 4.90 g/cm^3. The addition of SiO_2 caused a drop in density such that, when the SiO_2 content reached 30%, the density fell to

Card 1/2

The Surface Tension and Densities (cont.)

3.67 g/cm^3. The dependence of the specific volume on the composition was almost of a straight-line character, which showed how near an $FeO-SiO_2$ system comes to being an ideal one When in $MnO-FeO-SiO_2$ alloys SiO_2 was substituted for the MnO portion the surface tension declined in a straight-line fashion from 517 ergs/cm^2 when the SiO_2 and FeO_2 contents were 19.8% and 21.3 %, respectively, to 400 ergs/cm^2 when they were 45.0% and 23.7%, respectively. In $CaO-FeO-SiO_2$ alloys of orthosilicate composition the surface tension was 410-440 ergs/cm^2, changing but little when FeO was introduced in place of CaO. By contrast, the density in that event declined from 4.0 to 3.23 g/cm^3. The specific-volume curve against percent CaO (mol) followed a concave upward path.

S.P.

1. Oxides—Surface tension—Measurement 2. Silicate—Density —Density—Determination 3. Crucibles—Applications

Card 2/2

instead of lime has little effect on the surface tension of CaO - SiO_2 - MgO melts. The results obtained are explicable by the fact that with increasing electronegative character of the element (Ca, Al, Si) the proportion of the homopolar portion of its bond with oxygen increases. The method proposed by Appen[10] for calculating surface tension for a given composition was found to be applicable with the following values of the partial molar surface tensions: for SiO_2, 400 erg/cm^2; for CaO, 520 erg/cm^2; for Al_2O_3, 720 erg/cm^2; and for MgO, 530 erg/cm^2. For several CaO - SiO_2 - Al_2O_3 melts it was found that the surface tension falls with increasing temperature, the coefficient being 0.20 - 0.25 erg/cm^2.°C. The high values of the surface tensions of the oxide systems on which both steel melting and blast furnace slags are based suggest that they do not contain appreciable concentrations of molecules with saturated internal bonds. There are 4 figures, 5 tables, and 30 references of which 19 are Slavic.

Surface Tension of Fused Silicates.

78-3-21/35

ASSOCIATION: Ural Polytechnic Institute imeni S. M. Kirov . (Ural'skiy politekhnicheskiy institut im. S. M. Kirova.)

SUBMITTED: June 9, 1956.

AVAILABLE: Library of Congress.

Card 3/3

Yesin, O.A.

USSR/Physical Chemistry - Thermodynamics, Thermochemistry, Equilibria
Physical-Chemical Analysis, Phase Transitions. B-8

Abs Jour: Referat. Zhurnal Khimiya, No 2, 1958, 3814.

Author : O.A. Yesin, S. Ye. Lyumkis.
Inst :
Title : Behavior of Heavy Metal Oxydes in Melted Chlorides.

Orig Pub: Zh. neorgan. khimii, 1957, 2, No 5, 1145-1148.

Abstract: It was found that heavy metal (M) oxides become stratified in Na, K and Ba chlorides in consequence of microheterogeneity (formation of ion groupations M^{2+}-O^{2-}). The activity factor of M^{2+} decreases at the transition into the range rich of M. MO solutions in $CaCl_2$ do not become stratified due to the energy increase of the solvent cation bond with O^{2-}.

Card : 1/1 -49-

YESIN, O.A.; SRYVALIN, I.T.; KHLYNOV, V.V.

Studying the properties of fusions $PbO-Na_2O-SiO_2$ by means of electromotive forces. Zhur. neorg. khim. 2 10:2429-2435 O '57. (MIRA 11:3)

1. Ural'skiy politekhnicheskiy institut im. S.M.Kirova.
(Fusion) (Oxides) (Electrolysis)

AUTHORS: Yesin, O. A., Toporishchev, G.A. and Shurygin, P.M. (Sverdlovsk).

24-5-10/25

TITLE: Electrolysis of molten manganese containing slags. (Elektroliz rasplavlennykh margantsovistykh shlakov).

PERIODICAL: "Izvestiya Akademii Nauk, Otdeleniye Technicheskikh Nauk", (Bulletin of the Ac.Sc., Technical Sciences Section), 1957, No.5, pp.85-91 (U.S.S.R.)

ABSTRACT: The fulfilment of the Faraday law is one of the experimental proofs that the interaction between the metals and the slags is electro-chemical (1). Study of the electrolysis of slags rich in MnO and FeO is of particular interest since several authors (2 and 3) express the view that such slags are semi-conductors. In an earlier paper by two of the authors of this article (4) it was shown that cathodic precipitation of iron is possible not only from FeO-SiO_2 slags but also from FeO-Fe_2O_3 melts and the assumption was expressed that the deviation from the Faraday law may be due to the recharging of the ions of the iron. For judging the behaviour of manganese containing slags during electrolysis the authors considered it useful to investigate the cathodic process; the data published by F. Sauerwald and G. Neuendorf (11) are not detailed enough. The authors of this paper

Card 1/4

Electrolysis of molten manganese containing slags. (Cont.)

applied an improved method so as to establish the fundamental causes which determine the degree of utilisation of the current. For the experiments the authors used a cell of the same design as was described earlier (4) for studying the electrolysis of ferrous slags; it consists of a cylinder of molten magnesia into which three compartments are drilled, Fig.1, p.86. The quantity of electricity flow was measured by means of a copper Coulomb meter, the temperature was measured by platinum/platinum-rhodium thermocouple and the sequence of experiments was similar to the one described in an earlier paper by the authors (4). At the temperatures under consideration (1250-1400 C) liquid manganese could be used as a cathode but it was found preferable to use silver instead. The results of the electrolysis of $MnO-SiO_2$ slags at 1250-1350 C are summarised in Table 1, p.87 for 22 tests, the results of the electrolysis of $MnO-SiO_2-CaO$ slags with silver cathodes at 1250 to 1300 C (experiments Nos.23-30) and of $MnO-FeO-SiO_2$ slags at 1300 C (experiment No.31) and of the Fe-Mn alloy at 1500 C (experiments Nos.32 and 33) are summarised in Table 2, p.88, giving in both tables the percentage in weight of Mn^{2+}, Mn^{3+}, Fe total, current intensity, Amp hours and the yield in respect of the current

Card 2/4

Electrolysis of molten manganese containing slags. (Cont.) 24-5-10/25

of Mn in percent (Table 1) and of Mn and Fe in percent (Table 2). Data on the utilisation of the current in the case of anodic dissolution of the manganese in slags containing 68% MnO and 32% SiO_2 at 1260 to 1280 C are given in Table 3, p.90. It has been experimentally established that under certain conditions of electrolysis of molten manganese containing slags the Faraday law is fulfilled on the cathode as well as on the anode. It was found that reduction of the Mn^{3+} and Fe^{3+} ions to Mn^{2+} and Fe^{2+} ones is the fundamental cause reducing the cathodic yield, in respect of the current, of manganese. An increased ratio of the height to the diameter in the cathodic parts slows down to convection diffusion of the Mn^{3+} and Fe^{3+} ions and brings about a better utilisation of the current. Calcium oxide additions also have a favourable influence on the current utilisation of manganese slags and this is attributed to an increase in the viscosity of the slag which slows down convective diffusion of the manganese ions. It was found that for low current densities of manganese slags, containing only a slight percentage of iron oxides, iron will precipitate preferentially at the cathode and at higher current densities Mn will precipitate preferentially. The existence was

Card 3/4

Electrolysis of molten manganese containing slags. (Cont.) 24-5-10/25

established of a heterogeneous equilibrium

$$2\ Mn^{3+}_{slag} + Mn_{Ag} \rightleftarrows 3\ Mn^{2+}_{slag}$$

which is similar to the one established earlier for ferrous slags. It was found that the dissolution of silver in the studied melts is not related to the degree of oxidation of the slag but is directly proportional to the slag volume and the assumption is expressed that silver passes into the slag not in the ionic but in the atomic or the colloidal form.

There are 5 figures, 3 tables, 18 references, 11 of which are Slavic.

SUBMITTED: May 22, 1956.

AVAILABLE:

Card 4/4

Study by the e.m.f. method of the properties of hydrogen which is dissolved in liquid slags.

is that shown in Fig.1, the diagram of the last mentioned circuit is shown in Fig.2. Data and the results are entered in tables and plotted in graphs. The authors have proved experimentally that the reversible hydrogen electrode can be materialised relatively simply for molten slags which do not contain easily reducible oxides. New experimental data confirm that solid magnesium oxide which is in contact with the liquid slag operates as a sort of oxygen electrode. The measurements have shown that the activity of the water dissolved in the slag is proportional to the square root of the activity of the calcium oxide; this is in agreement with the assumption that the hydrogen in the slag is present in the form of hydroxyl anions. The relation between the e.m.f. of the oxygen-hydrogen cell and the oxygen activity permits considering the negative magnitude of the e.m.f. as a measure of the basicity of the slag. There are 4 figures, 5 tables and 15 references, 5 of which are Slavic.

Card 2/2

SUBMITTED: May 20, 1957.

ASSOCIATION: Ural Polytechnical Institute (Ural'skiy Politekhnicheskiy Institut), Sverdlovsk

AVAILABLE: Library of Congress.

Electrolytic desulphuring of iron. 24-12-15/24

temperature 1480 to 1500°C was studied, using ordinary and high magnesium content synthetic blast furnace slags. It is shown that the sequence of the cathodic processes corresponds to the respective potentials, namely, first the sulphur dissolves, this is followed by the reduction of chrome and, finally, the reduction of silicon takes place. The potentials for oxides at 1500°C are given for a number of reactions in Table 1; the results of preliminary tests on desulphuring irons are given in Table 2; Table 3 contains data on the results of tests carried out in a furnace with a chromium magnesite lining; Table 4 gives the consumption in ampere hours for desulphuring iron and reducing chromium and silicon for the slag for each thirty minutes of the smelting time; Table 5 gives the influence of the current density on the process of desulphuring for a test duration of ninety minutes, whilst Table 6 gives the influence of the basicity of the slag on the specific current efficiency in respect to sulphur for a current intensity of 75 A and a test duration of ninety minutes. Fig.2 shows the change in the sulphur content in the slag as a function of time for initial sulphur contents of 0.5 to 0.6%, using high

Card 2/3

Electrolytic desulphuring of iron. 24-12-15/24

magnesium slags, both for the case of passing a current through the electrolyte as well as for the reaction without passage of current.
There are 2 figures, 6 tables and 10 references, 9 of which are Slavic.

SUBMITTED: April 17, 1957.

AVAILABLE: Library of Congress.

Card 3/3

AUTHOR YESIN, O.A., LEPINSKIKH, B.M. 32-6-40/54

TITLE Crucibles made of Molten Magnesite for Research Work at High Temperatures.
(Tigli iz plavlenoy magnezii dlya issledovaniy pri vysokikh temperaturakh -Russian)

PERIODICAL Zavodskaya Laboratoriya, 1957, Vol 23, Nr 6, pp 752-753 (U.S.S.R.)

ABSTRACT Electrically molten magnesite can be used for the manufacture of melting crucibles to be used for research work carried out at high temperatures (1200-1600°) because of its fire-and slag resistance. It can also be used as oxygen electrode for measuring work. Magnesite smelt is obtained in electric arc furnaces. The block taken out of the furnace has three zones: an inner zone which has a sponge-like structure because of the gases separated during smelting and cannot be used for the purpose mentioned; there follows a second, ring-like, zone of fine crystelline magnesium oxide; it is of grey color and contains 2,5 % SiO; 1,2% Al_2O_3; 1,2% Fe_2O_3; 3,2% CaO and 92% MgO; the exterior crust-like zone is unusable and consists of not fully smelted magnesite. Molten magnesite is highly resistant against iron slag. Its solubility in the latter is approximatively expressed by the equation by Shilov-Nernst:
$\frac{dC}{dt} = \frac{D}{\delta} S(C_\infty - C) = a\text{-}bc$, where $\frac{dC}{dt}$ - denotes the velocity of the solving process, D -coefficient of diffusion, δ- diffusion layer, S-

Card 1/2

YESIN, O. A.

AUTHOR: Yesin, O. A. (Sverdlovsk). 74-12-2/4

TITLE: On the Construction of Silicate Melts (O stroyenii rasplavlennykh silikatov).

PERIODICAL: Uspekhi Khimii, 1957, Vol. 26, Nr 12, pp. 1374-1387 (USSR).

ABSTRACT: This article is a summary of the latest results obtained by research work in the filed of silicate melts. The bond metal-oxygen in silicate melts is differently iogenous, according to the metal. This is shwon by two diagrams on the basis of the dependence of surface tension on the ratio between charge number and atomic radius and the dependence of the isobaric activation potential of electric conductivity on Coulomb's attraction metal-oxygen. According to the effect produced by the electric current two groups of cations may be distinguished: Easily movable alkali- and alkaline earths ions and not easily movable ions of Al, Si, P. The latter are bound to the oxygen nearly entirely homopolarly. With the increase of the metal oxide concentration in a silicate melt also specific electric conductivity increases. Also the viscosity of the melts behaves in a manner that is analogous to conductivity. In 3 tables the values for the conductivity and viscosity of various melts are given.
The surface tension shows a nearly linear dependence on composition

Card 1/2

On the Construction of Silicate Melts. 74-12-2/4

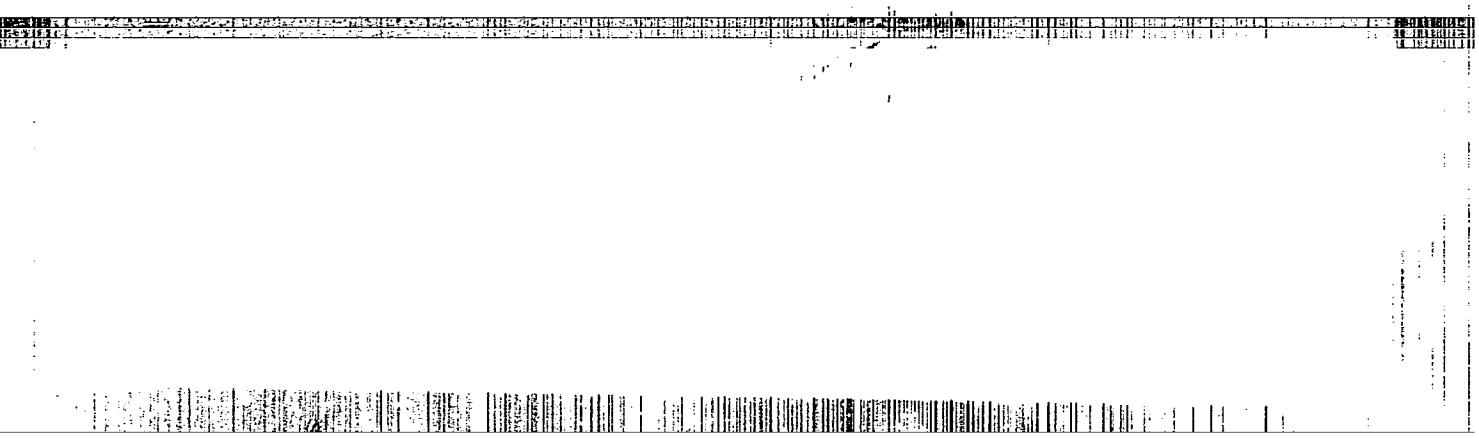
(figure 3). From the surface tension the binding energy can be approximately computed. The exact amount of binding energy was computed by Popel' and by the author (reference 2o). The results obtained according to the various formulae are compared with one another in table 4. The partial mol/volume of the oxides in the case of different compositions of the melts is then discussed (table 5). The dependence of the temperature coefficient of the surface tension on the SiO content is brought into connection with the change of the manner of binding.

With an increasing content of metal oxide anion complexes of different orders of magnitude form in the silicate melt. The solidity of these complexes can be judged by their formation heat. The electron conditions of silicate melts can be judged from the mol refraction. There are 7 figures, 5 tables, and 38 references, 18 of which are Slavic.

AVAILABLE: Library of Congress.

1. Silicate melts-Construction-Analysis

Card 2/2



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137-58-6-11528

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 40 (USSR)

AUTHOR: Yesin, O.A.

TITLE: The Electrochemistry of Fused Slags (Elektrokhimiya rasplavlennykh shlakov)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 5-27

ABSTRACT: A review is presented of experimental investigations into the electrical conductivity, the electrolysis, and the transference numbers of fused oxides, and the nature of their conductivity is examined. Studies on the mensuration of emf and polarization in silicate melts provide the basis for a discussion of their structure, the energy of reactions between particles, and the structure of the interface between the ME and the slag. The results of experiments in the study of the kinetics of desulfurization, of dephosphorization, and of the silicon-reduction process by means of radioactive isotopes are given, and an analysis thereof in the light of ion theory is given.

Card 1/1 1. Slags--Electrochemistry B.L.

137-58-6-11532

Translation from: Referativnyy zhurnal, Metallurgiya, 195.., Nr 6, p 41 (USSR)

AUTHORS: Nikitin, Yu.P., Yesin, O.A.

TITLE: On an Experimental Verification of the Equation for the Electrocapillary Curve at Elevated Temperatures (K eksperimental'noy proverke uravneniya elektrokapillyarnoy krivoy pri vysokikh temperaturakh)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 37-41

ABSTRACT: Measurement is made of the charging currents on an incipient metal surface in contact with slag, the cases being Fe-C and Mn-C alloys saturated with C and slag of the following content: CaO 39%, SiO_2 41%, and Al_2O_3 20% (I), and CaO 25%, SiO_2 63%, and Al_2O_3 12% (II). The experiments were conducted at temperatures of ~1500°C in fused-MgO crucibles. It is established that in both cases the metal surface in contact with the slag has a negative charge. In the case of Fe-C its magnitude is $3 \cdot 10^{-6}$, while in the case of Mn-C it is $6 \cdot 10^{-6}$ coulomb/cm^2. An electro-capillary curve is taken for Mn-C alloy and slag II. All that is derived is the cathode arm of the curve, corresponding to the presence of a negative charge of

Card 1/2

137-58-6-11532

On an Experimental Verification (cont.)

$9 \cdot 10^{-6}$ coulomb/cm^2 on the surface of the metal. The resting-drop test is used to study the relation of interphase tension σ of Mn-Fe and Mn-C alloys and slag II. An increase in the [Fe] in the alloy leads to an increase in σ; an increase in [C] leads to a decline therein. At 25 atom % C in the alloy, its magnitude is equal approximately to 540, and at 75% Fe to 1160 erg/cm^2. For pure Mn $\sigma \sim 1050$ erg/cm^2. Comparison of the magnitudes and sign of the electrical charges on the surface of metal alloys obtained by electrocapillary measurements and by charge currents testifies to the fact that the fundamental equation for the electrocapillary curve is valid for temperatures of $\sim$1500°C.

1. Slags--Electrical properties 2. Metals--Electrical properties 3. Slags--Phase studies 4. Metals--Phase studies 5. Electrochemistry--Applications

Yu.N.

Card 2/2

SOV/137-58-8-16397

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 8, p 25 (USSR)

AUTHORS: Yesin, O.A., Toporishchev, G.A., Shurygin, P.M.

TITLE: The Cathodic Deposition of Manganese From Molten Slags (Katodnoye osazhdeniye margantsa iz rasplavlennykh shlakov)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 67, pp 42-50

ABSTRACT: The deposition of Mn was made on a liquid Ag cathode from an $MnO-Mn_2O_3-SiO_2-MgO-CaO$ melt at 1250-1350°C. The current efficiency a increased from 20 to 90% in proportion to the decrease in the degree of oxidation of the melt (Mn^{3+}/Mn^{2+}). 10^3 from 5 to <1. The decrease in a is explained by the processes of incomplete reduction of Mn^{3+} on the cathode, i.e., $Mn^{3+} + e \rightarrow Mn^{2+}$. The liquid drops of Ag in the melts studied were saturated with Mn independently from the electrolysis. The transfer of Mn increased with an increase in the $(MnO)\%/(Mn_2O_3)\%$ of the slag.

P.Sh.

Card 1/1 1. Manganese--Electrodeposition 2. Silver (Liquid) cathodes --Performance 3. Slags--Properties

SOV/137-58-10-20471

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 10, p 18 (USSR)

AUTHORS: Yesin, O. A., Shikhov, V. N.

TITLE: Effect of Slag Composition and Temperature Upon Metal Dephosphorization Rate (Vliyaniye sostava shlaka i temperatury na skorost' obesforsforivaniya metalla)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 72, pp 237-245

ABSTRACT: It is established that substitution of FeO by CaO accelerates the dephosphorization (D) process. An increase of 11% in (CaO) results in the time required for attainment of equilibrium to be diminished from 9 to 6.5 min. Replacement of FeO by SiO_2 and Al_2O_3 reduces the D rate, V_p. An increase in (SiO_2) from 7 to 22% cuts the average V_p in half. An increase in (Al_2O_3) from 6 to 20% reduces the mean V_p by a factor of 1.5. O anions play a significant role in D. The increase in V_p when FeO is replaced by CaO is explained by a weakening of the bonds of the O ions with the slag cations, and also by the higher heat of formation of $Ca_3(PO_4)_2$. When FeO is replaced by SiO_2 and Al_2O_3 there is an increase in the bond energy of

Card 1/2

Effect of Slag Composition and Temperature (cont.)

the ions to the slags due to formation of adequately stable silicate complexes. When FeO is replaced by BaO, V_p increases. An increase from 10 to 17% in BaO increases V_p approximately 25-fold. Substitution of FeO by MgO to the extent of from 4 to 20 percent does not affect V_p. The effect of temperature upon V_p is studied at 1550, 1590, and 1690°C for the following slag (%): CaO 10.05, FeO 66.72, Fe_2O_3 16.23, MgO 4.85. The average V_p rises with increase in temperature, but the equilibrium [P] then declines. The following distribution coefficients have been derived: at 1640° K_1=0.5; at 1550° K_2=0.9. From this: $\Delta H = -2.3R\ (\log_{10}K_2 - \log_{10}K_1)/(1/T_2-T_1) = -4.575\ (\log_{10} 0.9-\log_{10} 0.5)/(5.38-5.1)\cdot 10^{-4} = 40,800$ cal/mole.

S. L.

1. Slags--Properties 2. Metal oxides--Chemical effects 3. Slags--Temperature factors

Card 2/2

137-58-6-11504

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 36 (USSR)

AUTHORS: Yesin, O.A., Shikhov, V.N.

TITLE: The Kinetics of the Reduction of Silicon by Molten Iron (Kinetika vosstanovleniya kremniya zhidkhim zhelezom)

PERIODICAL: Tr. Ural'skogo politekhn. in-ta, 1957, Nr 72, pp 246-251

ABSTRACT: Radioisotope Fe^{59} is used to investigate the kinetics of the $SiO_2 + 2[Fe] = 2(FeO) + [Si]$ reaction. The Fe^{59} was introduced into molten technical Fe, which was kept in a quartz crucible under an N_2 atmosphere within a carbon-resistance furnace, beneath slags made of SiO_2, Al_2O_3, CaO, MgO, and BaO. The rate of reduction of the Si by molten Fe is determined by the rate at which the Fe^{59} goes into the slag. Results of experiments with slag containing 61.2% SiO_2, 17.30% Al_2O_3, 19.43% CaO at 1580, 1620, and 1670°C show the energy of activation of the process to be 64,000 cal/mole. A change in the height of the slag layer from 8 to 25 mm does not affect the process rate. These data support the conclusion that the limiting factor in the process of Si reduction is not the diffusion of Fe ions in the slag or of Si in the metal, but the chemical activity.

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137-58-6-11504

The Kinetics of the Reduction of Silicon by Molten Iron

Experiments conducted with slags consisting of 32.1% MgO and 66.4% SiO_2, 34.6% CaO and 64.18% SiO_2, 37.72% BaO and 59.11% SiO_2 at 1580° showed that replacement of MgO by CaO diminishes the rate of Si reduction by 82%, while when BaO is used it is reduced by more than 90%. These facts have clarified the differing influence of the Mg^{2+}, Ca^{2+}, and B^{2+} cations on the strength of the bond between Si and O in the slag.

I.T.

1. Silicon--Reduction 2. Iron (Liquid)--Applications 3. Iron isotopes (Radioactive) --Applications 4. Slags--Properties

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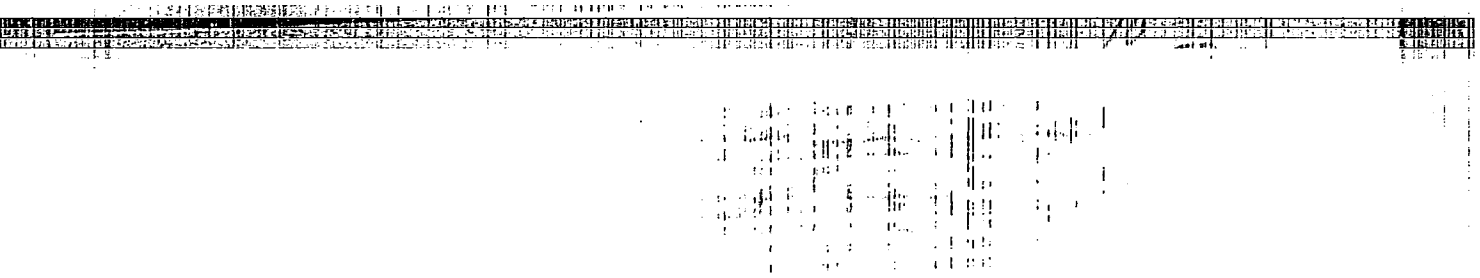

APPROVED FOR RELEASE: 03/15/2001 CIA-RDP86-00513R001962920010-1"

PA - 2913

AUTHOR: YESIN,O.A. and CHECHULIN,V.A.

TITLE: Electrolysis of $CaO-Al_2O_3-SiO_2$ Melts. (Elektrolis rasplavov $CaO-Al_2O_3-SiO_2$, Russian).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 1, pp 109 - 111 (U.S.S.R.)

Received: 5 / 1957 Reviewed: 7 / 1957

ABSTRACT: There are only few published references concerning this problem. It was proved that FARADAY's law is satisfied in the case of oxygen-elimination, as CO and CO_2 on the carbon anode. In order to collect the products of the cathode-process, liquid pig-iron and copper were used as cathodes. Charcoal-crayons served as anodes. The experiments were carried out in a tripartite cell of molten magnesia.

The occurrence of bivalent silicon in the slag was observed on frequent occasions and the shape of the corresponding polarization-curves proves the possibility of a re-charge. The relatively diffusion of the bivalent silicon into the catholyte mirror and its oxidation by the furnace-temperature up to 4-atomicity reduce the silicon yield per current-unit. The lower utilization of current in the case of the discharge of Al and Mg compared to Si, is qualitatively in line with the constancy of these oxides, or, more precisely, expressed, with the rising value of the standard-isobar-potential

Card 1/2

YESIN O.A.

20-1-17/44

AUTHORS: Nikitin, Yu.P., Yesin, O.A.

TITLE: The Exchange Current between Liquid Metal and Slag (Tok obmena mezhdu zhidkim metallom i shlakom)

PERIODICAL: Doklady AN SSSR, 1957, Vol. 116, Nr 1, pp. 63 - 65 (USSR)

ABSTRACT: For the precise definition and renewed examination of the values of the capacity of the double layer (C_g) found already previously at 50 cycles on the boundary between metal salg and of the reaction resistance (R_r), the authors caried out measurements within the frequency range of from 50 to 1700 cycles. The experiments were carried out at temperatures of between 1480 and 1560° in a furnace with a carbon resistance, in which a vat made of magnesia oxide was fitted. The thin inclined and vertical channels of this vat were filled with liquid metal, and above this the slag was located. Both electrodes had the same composition and the same contact surfaces with the slag. The experiments were carried out with an alternating current bridge, and the amperage to be measured with a zero-device was previously amplified about 200 times by a two-tube amplifier. The following measuring results were obtained: The capacity C_g remained

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20-1-17/44

The Exchange Current between Liquid Metal and Slag

PRESENTED: April 12, 1957, by, A.N. Frumkin, Academician

SUBMITTED: April 12, 1957

AVAILABLE: Library of Congress

Card 3/3

YESIN, O.A.

YESIN O. A.

LEONIDOV, N.K.

25(5) PHASE I BOOK EXPLOITATION SOV/1497

Akademiya nauk SSSR. Institut nauchnoy i tekhnicheskoy informatsii

Metallurgiya SSSR, 1917-1957, t. 1 (Metallurgy of the USSR, 1917 - 1957, Vol. 1) Moscow, Metallurgizdat, 1958. 745 p. 3,000 copies printed.

Ed. (Title page): I. P. Bardin, Academician; Ed. (Inside book): G. V. Popova; Tech. Ed.: G. G. Bekker.

PURPOSE: The book is intended for scientific workers and engineers in metallurgical plants and in the machine-building industry. It may also be used by students in advanced courses in metallurgical vuzes.

COVERAGE: This collection of articles covers extensively practical and theoretical developments in Soviet metallurgy during the last 40 years. The material deals with the discovery and development of the major ore deposits and the growth of the metal industry in various parts of European and Asiatic USSR. Research institutes, laboratories, their location, and the names of the scientists and engineers involved are listed. Many papers contain so many references and names of various personalities that it was considered beyond the scope of the coverage of each article to list them. The authors claim that the processes, methods and theories described in this book reflect the most recent developments in Soviet metallurgy.

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Metallurgy of the USSR (Cont.) SOV/1497

of slags, thermic processes and pyrometallurgy. The electrolysis of molten salts and aqueous solutions was the object of many studies. The author states that only a part of the work currently done in nonferrous metallurgy has been mentioned in this paper. There are 331 Soviet references.

Yesin, O. A. Development of the Theory of Liquid Slags in the USSR 701

The rapid development of modern metallurgy called for a more thorough knowledge of the composition, behavior, and reaction of molten slags in metallurgical processes. Starting with this premise the author goes on to evaluate the various theories developed and experiments performed by Soviet metallurgists. The molecular theory is said to have dominated the thinking of many outstanding Soviet scientists such as Baykov, Samarin, Pavlov, Grum Grzhimaylo, et al. This theory has been complemented by the introduction of the ionic concept, and later, by the ionic theory of liquid slags. Numerous formulas, graphs, and equations explain and confirm the fundamentals of these theories. The ionic theory was successfully applied in the electrolysis of molten metals to extract various elements. The author, in cooperation with Diyev,

Card 20/21

YESIN, O. A.

18(0) PHASE I BOOK EXPLOITATION SOV/1728

Akademiya nauk SSSR. Institut metallurgii

Sovremennyye problemy metallurgii (Modern Problems in Metallurgy) Moscow, Izd-vo AN SSSR, 1958. 640 p. 3,000 copies printed.

Resp. Ed.: A.M. Samarin, Corresponding Member, USSR Academy of Sciences; Eds. of Publishing House: V.S. Rzhevnikov, and A.N. Dernov; Tech. Ed.: T.V. Polyakova.

PURPOSE: This book is intended for scientific and technical personnel in the field of metallurgy.

COVERAGE: This is a collection of articles on certain aspects of Soviet metallurgy. The book is dedicated to Academician Ivan Pavlovich Bardin on the occasion of his 75th birthday. The book is divided into seven parts. The first part consists of two articles presenting a brief account of the biography and professional activity of the Soviet metallurgist. It includes an article by John Chipman, Nicholas Grant, and John Elliott (M.I.T., USA) describing their meeting with Bardin in Moscow and also his visit to the United States. The second part consists of three articles and deals with raw materials and fuels for the Soviet metallurgical industry. The third part represents the major portion of the book. It consists of 25 articles dealing with the various aspects of the metallurgy of pig iron and steel. The fourth part consists of two articles treating the metallurgy of nonferrous metals. The fifth part consists of three articles on the forming of metals. The sixth part consists of eight articles discussing certain aspects of physical metallurgy. The last part deals with general problems in the field of metallurgy. References are given after each article. No personalities are mentioned.

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Modern Problems in Metallurgy SOV/1728

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YESIN, O.A.
P. 1, 5

18(0); 5(2) PHASE I BOOK EXPLOITATION SOV/3100

Akademiya nauk SSSR. Ural'skiy filial. Institut metallurgii

Trudy, Vyp. 4 (Transactions of the Institute of Metallurgy, Ural Branch, Academy of Sciences, USSR; No. 4) Sverdlovsk, 1958. 157 p. Errata slip inserted. 1,000 copies printed.

Editorial Board: N.A. Vatolin (Resp. Ed.), Candidate of Technical Sciences; A.S. Mikulinskiy, Professor, Doctor; V.Ya. Miller, Professor; P.A. Pazdnikov, Candidate of Technical Sciences; and S.S. Lisnyak, Candidate of Technical Sciences; Ed.: M.S. Baranovskaya.

PURPOSE: This book is intended for ferrous and nonferrous metallurgists.

COVERAGE: The book presents results of investigations of theoretical problems in metallurgy and chemistry and gives information on the efficient use of raw materials in ferrous and nonferrous metallurgy and on the development of new production processes in the metallurgical and chemical industries. The articles were written by junior members and experienced specialists of the scientific staff of the Institutes of Metallurgy, Chemistry, and Electrochemistry, Ural Branch, Academy of Sciences, USSR.

Card 1/5

AVAILABLE: Library of Congress

VK/jb
1-23-60

Card 5/5

MUSICHIN, V. I., ESIN, O. A. and LEPINSKIKH, B. M.
Sverdlovsk Polytechnic Institute

"Influence of the Vacuum Pig-Iron Treatment on the Activity of Dissolved Silicon."

paper presented at Second Symposium on the Application of Vacuum Metallurgy.

Moscow - July 1958

SOV/137-58-9-18659

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 9, p 71 (USSR)

AUTHORS: Yesin, O.A., Kholodov, A.I., Gel'd, P.V., Popel', S.I.

TITLE: Electrochemical Refining and Alloying of Ferrous Metals (Elektrokhimicheskoye rafinirovaniye i legirovaniye chernykh metallov)

PERIODICAL: V sb.: Staleplavil'n. proiz-vo, Moscow, Metallurgizdat, 1958, pp 151-161

ABSTRACT: A description is offered of the results of experiments in 1948-1952 in the electrochemical refining and alloying of metals. The laboratory experiments were run in a resistance furnace with a Silit electrode and in a 50-kg high-frequency furnace. Electrochemical refining of metal proved feasible. The application of an external electrical field to a metal-slag system makes it possible to regulate the speed and completeness of transfer of S from the metal into the slag. Pilot-plant experiments at the Verkh-Isetsk Plant employed a D-C generator (1000 amps, 120 v). The metal was poured into a 300-kg ladle. The results of the industrial experiments showed that when an external electrical field was applied the removal of

Card 1/2

Electrochemical Refining and Alloying of Ferrous Metals

sulfur from the steel proceeds with considerably greater efficiency than without electrolysis. Depending upon the initial composition of the metal and the slag and upon the quantity thereof, the S content diminished by 0.020-0.045% during the first 10 min. Simultaneously with the removal of S from the metal, an increase in Si content was observed. Current efficiency was from 20 to 96%. The experiments demonstrated the desirability of further development of the method and of its introduction into industrial practice.

L.K.

1. Ores--Processing 2. Metals--Production 3. Iron alloys--Production
4. Metals--Electrochemistry

SOV/163-58-1-4/53

AUTHORS: Shurygin, P. M., Yesin, O. A.

TITLE: The Electronic Conductivity of Slags (Ob elektronnoy provodimosti shlakov)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 16-19 (USSR)

ABSTRACT: The properties of the metallurgical slags were investigated with regard to their semiconductor properties. To reach this aim the thermal and photoconductivity as well as the electromagnetic effects in solid and liquid silicates of iron copper and manganese were investigated.
The differential thermo-EMF $\alpha = \frac{dE}{dT}$
was determined at 1350 - 1400° as compared to platinum.
The results showed that the thermal conductivity and electric conductivity are negative in most cases. This means that the conductivity has an electronic character. The slags with a higher content of iron oxide have a positive value for α.
The changes in the slags in the electromagnetic field were further investigated. The results of these investigations show a behavior similar to metals and semiconductors, and

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they prove that the conductivity of the slags has electronic character. There are 3 figures and 11 references, 10 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut
(Ural Polytechnical Institute)

SUBMITTED: October 4, 1957

SOV/163-58-1-8/53

AUTHORS: Nikitin, Yu. P., Yesin, O. A., Sryvalin, I. T.

TITLE: The Capacity of the Double Layer at the Boundary Between the Aluminum and the Cryolite-Alumina Melt (Yemkost' dvoynogo sloya na granitse alyuminiya s kriolito-glinozemnym rasplavom)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 1, pp 37-39 (USSR)

ABSTRACT: The capacity of the double layer at the boundary between the aluminum and the cryolite-alumina melt was determined by direct measurements at different composition of the alumina melt. From the result may be seen that a decrease of the cryolite ratio to 6 - 1,9 does not at all influence the capacity, whereas an increase of the aluminum oxide content considerably increases the capacity of the boundary layer. The dielectric constant ε of the boundary layer was measured (see Table). In addition to the capacity the resistance and the diffusion were also measured.
When the cryolite content is changed no considerable change of the diffusion coefficient takes place; a change in the

Card 1/2

The Capacity of the Double Layer at the Boundary Between the Aluminum and the Cryolite-Alumina Melt

Al_2O_3 content, however, increases the diffusion coefficient. There are 2 figures, 1 table, and 12 references, 12 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: October 4, 1957

YESIN, O. A.

AUTHORS: Yesin, O.A., and Lepinskikh, B. M. (Sverdlovsk). 24-1-22/26

TITLE: Electro-chemistry of phosphorous slags. (K elektrokhimii fosforistykh shlakov).

PERIODICAL: Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk, 1958, No.1, pp. 135-139(USSR).

ABSTRACT: The electric conductivity is investigated of iron-phosphorous slags, the electrolysis and also the cathode and anode polarisations. The specific electric conductivity was studied of Fe-P slags containing 19,5 and 28.8% P_2O_5 in the temperature range 780 to 1250°C. It was established that an increase in the Fe_2O_3 content leads to an increase of the electric conductivity and to a decrease of the activation energy of the studied alloys. It was found that substitution of FeO by CaO reduces the conductivity and increases the activation energy. The possibility of electrolysis is experimentally confirmed for a system with electrodes consisting of liquid alloys of iron with phosphorus.. The slag containing $FeO-Fe_2O_3-P_2O_5$ being the electrolyte. The experiments are described as well as the results. The dependence of the electric conductivity on the temperature for the system $FeO-Fe_2O_3-P_2O_5$ are graphed in Fig.2.

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Electro-chemistry of phosphorous slags. 24-1-22/26

The isotherms of electric conductivity and the activation energy for the slags $FeO-Fe_2O_3-P_2O_5$ are graphed in Fig.3. The isotherms of the electric conductivity in the system $FeO-Fe_2O_3-P_2O_5$ for a constant content of Fe_2O_3 are graphed in Fig.4. Fig.5 contains the isotherms of the electric conductivity in the system $FeO-Fe_2O_3-CaO-P_2O_5$, whilst the cathodic and the anodic branches of the polarisation curves for $FeO-Fe_2O_3-P_2O_5$ slags are graphed in Fig.6. The compositions of the individual slags are entered in Tables 1 and 2. The current efficiency of P and Fe, for various current densities, at 1250°C are entered in Table 3 and for various other temperatures in Table 4. The results are discussed, particularly the influence of calcium additions. There are 6 figures, 4 tables and 9 references - 6 Russian, 3 English.

SUBMITTED: November 1, 1956.

AVAILABLE: Library of Congress.

Card 2/2

AUTHORS: Vorontsov, Ye. S., Yesin, O. A. SOV/163-58-2-3/46

TITLE: On the Surface and Volume Diffusion in Molten Slags (O poverkhnostnoy i ob'yemnoy diffuzii v rasplavlennykh shlakakh)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 2, pp. 16-23 (USSR)

ABSTRACT: The present paper by means of the radioactive isotopes P^{32}, Ca^{45}, S^{35} and Fe^{59} investigates the surface and volume diffusion in molten slags and the wandering off rate of the components of the slags. The diffusion mechanism of phosphorus and calcium in acid furnace slag in graphite and corundum crucibles was explained. It turned out that the diffusion coefficients D_p and D_{Ca} are almost the same, and that the diffusion coefficient of phosphorus is only a little higher. The experiments with solid slag samples showed that calcium and phosphorus diffuse at measurable rates. Phosphorus diffuses in acid furnace slag as a simple anion form, whereas calcium diffuses mostly as monoatomic cation. The diffusion of calcium and iron in the melt $CaO-Al_2O_3-SiO_2$ was investigated in corundum crucibles. The dependence of

Card 1/2

On the Surface and Volume Diffusion in Molten Slags

lgD on $\frac{1}{T}$ shows that with an increase in temperature the free volume of the slag melt increases. In the experiments carried out it was shown that the dependence of lgD on $\frac{1}{T}$ is possible in the following cases:

1) $\frac{d(\lg D)}{d(1/T)}$ decreases with an increase in temperature.

2) $\frac{d(\lg D)}{d(1/T)}$ remains constant

3) $\frac{d(\lg D)}{d(1/T)}$ increases with an increase in temperature.

There are 3 figures, 4 tables, and 11 references, 5 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnical Institute)

SUBMITTED: October 4, 1957

SOV/137-57-2-2379

Translation from: Referativnyy zhurnal. Metallurgiya, 1959 Nr 2, p 22 (USSR)

AUTHOR: Yesin, O. A.

TITLE: The Electrochemistry of Molten Slags (Elektrokhimiya rasplavlennykh shlakov)

PERIODICAL: Tr. In-ta metallurgii. Ural'skiy fil. AN SSSR 1958 Nr 2 pp 41-45

ABSTRACT: Results obtained by the author and coworkers are adduced briefly on the following subjects: Investigations of the electrolysis of liquid metallurgical slags; a study of the transference numbers and the electric conductivity of blast-furnace and ferrous slags; a study of concentration circuits in which molten slags served as the electrolyte and the molten Fe-carbon alloys served as the electrodes; and a study of electrocapillary phenomena and electrode polarization in the liquid slag molten-metal system. Bibliography: 40 references.

N. V.

Card 1/1

VESIN, O. A.

24-2-24/28

AUTHORS: Vorontsov, Ye. B. and Yesin, O. A. (Sverdlovsk).

TITLE: On the mechanism of diffusion in liquid slags. (O mekhanizme diffuzii v zhidkikh shlakakh).

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, No.2, pp. 152-155 (USSR).

ABSTRACT: By means of the radio-active tracers P^{32}, S^{35}, Ca^{45} and Fe^{59}, the simultaneous diffusion of S, Ca, Fe and P was studied in the liquid slags $CaO-Al_2O_3-SiO_2$ and in solid alloys of $CaO-P_2O_5$. It was found that the diffusion coefficients increased with decreasing crystallographic radii of the ions; appreciable deviations from the Stokes-Einstein equations were observed for P and it is concluded that five-valent P diffuses simultaneously with oxygen in the form of electro-neutral particles, i.e. in the form which is intermediate between a complex anion and a simple cathion. It was established that the experimentally determined coefficient of diffusion of the cathion of calcium differs little from the value calculated from the electric conductivity on the basis of the Nernst-Einstein equation; this and also the fact that the energies of the diffusion activation and of the conductivity are

Card 1/2 values near to each other indicate the existence of

On the mechanism of diffusion in liquid slags. 24-2-24/28

preferential individual displacement of calcium cathions. Unequal shapes of diffusing particles in P and Ca are explained by differing covalency fractions as regards the relations between these cathions and the oxygen anions. There are 2 figures, 1 table and 7 references - 5 English, 2 Russian.

SUBMITTED: June 17, 1957.

AVAILABLE: Library of Congress.

Card 2/2

78-3-6-15/30

AUTHORS: Zyazev, V. L., Yesin, O. A.

TITLE: Viscosity and Density in the V_2O_5-PbO-System (Vyazkost' i plotnost' sistemy V_2O_5-PbO)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 6, pp. 1381-1385 (USSR)

ABSTRACT: The viscosity and the density of the enamels of the V_2O_5-PbO-system including the pure oxides of V_2O_5-PbO were determined.
The determinations of density were performed by heating and cooling the enamel.
The dependence of temperature on the viscosity and density in the V_2O_5 enamels with a PbO content of 28,3-88,9% was investigated.
The density of the enamels of the V_2O_5-PbO-system was investigated at temperatures of 800, 1000, and 1200°C.
At 68% PbO a minimum is observed in the density curve and in alloys with 79,7% a break was found. Probably the atomic groupings occur in the enamel under formation of the following chemical compounds:

Card 1/2

Viscosity and Density in the V_2O_5-PbO-System 78-3-6-15/30

$V_2O_5 \cdot 2PbO$, $V_2O_5 \cdot 3PbO$, $V_2O_5 \cdot 8PbO$.

It was found that in the enamel of the system at 1000°C a relatively high specific conductivity and little viscosity are prevailing. The existence of the above-mentioned chemical compounds was confirmed by the curves of viscosity and the determinations of density of the enamels of the V_2O_5-PbO-system. There are 3 figures, 2 tables, and 10 references, 7 of which are Soviet.

ASSOCIATION: Institut metallurgii Ural'skogo filiala Akademii nauk SSSR (Institute of Metallurgy, Ural Branch AS USSR)

SUBMITTED: July 29, 1957

AVAILABLE: Library of Congress

1. Enamels--Viscosity 2. Enamels--Density 3. Viscosity--Temperature factors 4. Density--Temperature factors

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SOV/78-3-9-23/38

AUTHORS: Yesin, O. A., Zyazev, V. L.

TITLE: The Electric Conductivity of the Systems V_2O_5-PbO, V_2O_5-CaO, and V_2O_5-MgO (Elektroprovodnost' sistem V_2O_5-PbO, V_2O_5-CaO i V_2O_5-MgO)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2143-2149 (USSR)

ABSTRACT: The electric conductivity in the systems V_2O_5-PbO, V_2O_5-CaO, and V_2O_5-MgO was investigated within the temperature range of the liquid and solid state. Three congruently melting compounds occur in the system V_2O_5-PbO: $V_2O_5 \cdot 2PbO$, $V_2O_5 \cdot 3PbO$, and $V_2O_5 \cdot 8PbO$. The electric conductivity is investigated in pure V_2O_5 and PbO as well as in nine melts containing 23,5-95% PbO. The isothermal lines of the electric conductivity and the values of the activation energy E were compared as well in the phase diagram. Two maxima occur on the curve of the activation energy: 14,4 k.cal/mol in the case of 87% PbO and 15,2 k.cal/mol in the case of 98% PbO. These maxima correspond to the occurrence of

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The Electric Conductivity of the Systems V_2O_5-PbO, V_2O_5-CaO, and V_2O_5-MgO

the following chemical compounds: $V_2O_5 \cdot 3PbO$ and $V_2O_5 \cdot 8PbO$. The electric conductivity is increased with rising PbO-content up to 45%. The electric conductivity in the system V_2O_5-CaO was investigated for melts of V_2O_5-CaO with 11,7 - 37% CaO. The melt has ionic conductivity at 23,4% CaO. The compound $V_2O_5 \cdot CaO$ exists in the liquid melt. In the initial period the electric conductivity decreases rapidly to 10% CaO in these melts, probably in consequence of the dissociation of V_2O_5 at higher temperatures. The system V_2O_5-MgO is completely analogous to the system V_2O_5-CaO. The melt has ionic conductivity at a MgO content of 20,7%. MgO, CaO, and PbO influence the structure of V_2O_5 in the melt. The form of the isothermal lines of the electric conductivity and the curves of the activation energy indicate the presence of the following compounds in the melt of the systems investigated: $V_2O_5 \cdot 3PbO$, $V_2O_5 \cdot 8PbO$, $V_2O_5 \cdot CaO$, $2V_2O_5 \cdot 3MgO$. There are 6 figures, 3 tables, and 12 references,

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The Electric Conductivity of the Systems V_2O_5-PbO, V_2O_5-CaO, and V_2O_5-MgO

5 of which are Soviet.

ASSOCIATION: Ural'skiy filial Akademii nauk SSSR, Institut metallurgii (Ural Branch, AS USSR, Institute of Metallurgy)

SUBMITTED: January 15, 1957

Card 3/3

MUSIKHIN, V.I.; YESIN, O.A.; LEPINSKIKH, B.M.

Determining silicon activity in liquid cast iron with variable composition and pressure of the gaseous phase. Trudy Inst. met. UFAN SSSR no.4:5-7 '58. (MIRA 12:10)
(Gases in metals) (Activity coefficients)

LEPINSKIKH, B.M.; YESIN, O.A.; MUSIKHIN, V.I.

Silicon activity in liquid cast iron and the effect of manganese and phosphorus on it. Trudy Inst. met. UFAN SSSR no.4:9-13 '58. (MIRA 12:10)

(Cast iron--Metallurgy) (Activity coefficients)

18(3)
AUTHORS: Shikhov, V.N., Yesin, O.A.

SOV/163-58-4-4/47

TITLE: Distribution of Phosphorus Between Iron and Barium Slags (Raspredeleniye fosfora mezhdu zhelezom i bariyevymi shlakami)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Metallurgiya, 1958, Nr 4, pp 23 - 27 (USSR)

ABSTRACT: In the paper (Ref 1) it is assumed that by substituting calcium oxide by barium oxide in the slag it should be possible to eliminate phosphorus from the metal to a higher extent. In order to obtain direct confirmations by tests the equilibrium of the phosphorus between iron and slags containing barium oxide was analyzed. The experimental method used has already been described in the paper (Ref 4). Technically pure iron was employed for the tests. The slags consisted of synthetic alloys of oxides of calcium, barium, silicon, magnesium and iron. The concentration of BaO varied between 5 and 35 %. The tests showed an increase of the distribution index of phosphorus within the composition range investigated, like the ratio of the radioactivities of the slag to those of the metal, with the rising content of calcium oxide as well as of barium oxide. In order to clarify the effect of substituting CaO by BaO the

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constants of the reaction of equilibrium at dephosphorization were calculated by the formula of P.Gerasimenko (Ref 1) (1). A comparison with the results calculated by the formula of Kozheurov (Ref 7) does not show a great difference. - It is shown that at least O^{2-} and Fe^{2+}-ions should be contained in the slag for dephosphorization of the metal. Phosphorus can only turn into a slag consisting of iron oxide. The distribution factors, however, are not remarkable in such a case. The presence of Fe^{2+} ions in the slag permits the transition of phosphorus whilst the ions of barium contribute to complete the transition. The introduction of the cation of Si^{4+} or of Al^{3+} into the slag will bind the O^{2-} ions still more, and reduce the distribution factor of phosphorus. It is shown how the degree of dephosphorization increases with the basicity of the slag at a constant ratio BaO/FeO. There are 2 figures, 3 tables, and 9 references, 6 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SOV/149-58-4-9/26

AUTHORS: Sryvalin, I.T., Yesin, O.A., Nikitin, Yu.P.

TITLE: Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys (Termodinamicheskiye svoystva rasplavov sistemy med'-nikel'-sera)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya, 1958, Nr 4, pp 66-72 (USSR)

ABSTRACT: The object of the present investigation was to obtain data on deviation of the Cu-Ni-S melts from the ideal solutions. This was done by measuring the emf of the concentration cell formed by solid nickel (99.9% purity) on one side, and molten Ni-Cu or Ni-S alloy on the other. Molten acid slag containing 20% CaO, 30% Na_2O, 33% SiO_2, 15% Al_2O_3 and 2% NiO was used as the electrolyte. The experiments were carried out in a fused magnesia vessel shown on Fig.1. The metal electrodes were contained in two vertical channels connected at the top by a central compartment filled with the electrolyte. The lower ends of the vertical channels led to two inclined channels

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Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys

housing graphite leads and filled with a neutral slag protecting the metal electrodes from oxidation. The results of the measurements taken at 1340 - 1360°C are given in Table 1, for the Cu-Ni alloys and in Table 2 for the Ni-S alloys. From these data the activity of Ni-Cu and S in the Cu-Ni and Ni-S melts was calculated. The calculated activity values were in good agreement with those obtained by Vol'skiy (Ref.2) in his investigation of chemical equilibrium and with the published data on the equilibrium diagrams of the Cu-Ni and Ni-S systems. It is shown that the equations of the ideal solutions are not applicable to the Ni-S melts which however can be adequately described by the expressions derived by the Authors (equations 10 and 11) in which non-additive character of the bond between dissimilar atoms had been taken into account. It is shown by comparison with literary data that the activity values of Ni, Cu and S, determined by the emf. method, are in good agreement with those determined by

Thermodynamic Characteristics of Molten Copper-Nickel-Sulphur Alloys

the method of chemical equilibrium and the fusion diagrams Cu-Ni and Ni-S. The Cu-Ni and Ni-S melts were found to be characterised by a negative deviation from the ideal solutions, small in the former and large in the latter case. There are 4 figures, 3 tables and 12 references of which 7 are Soviet, 4 English and 1 German.

ASSOCIATION: Ural'skiy Politekhnicheskiy Institut. Kafedra Teorii Metallurgicheskikh Protsessov (Ural Polytechnical Institute, Chair of the Theory of Metallurgical Processes)

SUBMITTED: 21st March 1958.

Card 3/3

CHUCHMAREV, S.K., kand.tekhn.nauk, dotsent; YESIN, O.A., doktor tekhn.nauk, prof.; BARMIN, L.N., inzh.

Effect of electric current on the behavior of hydrogen dissolved in liquid metal. Izv. vys. ucheb. zav.; chern.met. no.5:59-64 My '58. (MIRA 11:7)

1.Ural'skiy politekhnicheskiy institut.
(Metals--Hydrogen content) (Liquid metals)

SOV/137-59-1-1516

Translation from: Referativnyy zhurnal. Metallurgiya, 1959, Nr 1, p 202 (USSR)

AUTHORS: Popel', S. I., Yesin, O. A., Korpachev, V. G.

TITLE: On the Method of Measuring the Surface Viscosity of Silicate Melts (K metodike izmereniya poverkhnostnoy vyazkosti silikatnykh rasplavov)

PERIODICAL: Izv. Sibirsk. otd. AN SSSR, 1958, Nr 5, pp 66-73

ABSTRACT: A description of apparatus and methods employed in the determination of the surface viscosity (V) of high-temperature silicate melts. The process is based on the method of damped oscillations (O) of a disk which intersects the surface of the liquid. The vibrating device consists of an iron disk, 20 mm in diameter and 6 mm high, which is rigidly coupled to a rod by means of a special joint and is suspended by a nichrome wire. The joint carries a small mirror and a clamp for the wire; the upper face of the joint supports two iron plates in which torsional vibrations are induced with the aid of an electromagnet; the vibrations are registered on a graduated scale by means of a ray of light reflected from the mirror. The slag being investigated is charged into an Fe crucible, 50 mm deep and 50 mm

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On the Method of Measuring the Surface Viscosity of Silicate Melts

in diameter, and the crucible is placed into an electric Kryptol furnace. The temperature of the melt is controlled with the aid of an optical pyrometer; in order to achieve an inert atmosphere, N_2 is introduced into the hermetically-sealed furnace. The depth of immersion of the disk is determined by means of a control lamp mounted on the lifting mechanism. After the desired temperature had been attained, the crucible containing the slag is placed into the furnace which is then closed; the vibrating device is centered, the disk is immersed into the slag to a depth equivalent to half of its height, and torsional O's are induced in it. Depending on the V, the amplitude is recorded at intervals of one, five, ten or more O's, and from these O's the logarithmic surface damping decrement, λ_{surf}, is computed. After repeating this procedure five or more times the disk is immersed into the slag to a depth of 5 mm measured from its upper surface and the volumetric damping decrement, λ_{vol}, is determined. The relative value α of the V of the surface layer is determined from the ratio $\alpha = \lambda_{surf} / \lambda_{vol}$; in order to determine the absolute values of the V, the thickness of the surface layer must be known. The volumetric V is computed from the magnitude of the damping decrement of the disk O's within the slag. The apparatus is previously calibrated at a temperature of 20°C against standard liquids, such as water, mercury, and liquid paraffin. An investigation of the surface and volumetric V demonstrated that the surface layer of a number of

On the Method of Measuring the Surface Viscosity of Silicate Melts

liquid slags exhibits an increased V; the latter increases when SiO_2 and Fe_2O_3 are introduced into the FeO, or when MgO and Al_2O_3 are added to the silicate melt.

Z. F.

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SOV/24-58-6-2/35

AUTHORS: O.A. Yesin and V.L. Zyazev

TITLE: Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other Complex Systems (Elektroprovodnost' dvoynykh sistem pyatiokisi vanadiya s okisyu zheleza i okis'yu medi i nyada slozhnykh splavov)

PERIODICAL: Izvestiya akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 6, pp 7-11 (USSR)

ABSTRACT: The electrical conductivity of several oxide systems was investigated to ascertain the extent to which they constituted semi-conductors in the solid and liquid states. The quasi-binary systems V_2O_5 - Fe_2O_3 and V_2O_5 - CuO were studied together with three compositions based on the ternary system V_2O_5 - CaO - Fe_2O_3 (see the table on p 10). Two quaternary melts (V_2O_5 32.8%, CaO 38%, SiO_2 19%, MgO 10%, and V_2O_5 18.6%, CaO 23.4%, SiO_2 27.2%, MnO 10%) of industrial importance were also investigated. A carbon element resistance furnace was used for the research, the reaction between the carbon and metallic oxides at high temperatures being prevented by a porcelain lining

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Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other complex systems

tube. The conductivity measurements were made over temperature ranges covering both liquid and solid states. The melts were held in corundum crucibles. The resistance was determined by means of a bridge fed with a 100 c.p.s. current, using a cathode ray oscillograph to indicate the balance conditions. Platinum wire electrodes were employed for immersion into the oxide mixtures. The accuracy of the measurements was 10 to 15%. The experimental mixtures were heated to the maximum temperature and held at that temperature for 15 to 20 minutes, after which the melt was cooled and reheated. The most reliable conductivity measurements were obtained during the second heating cycle, and only these values are discussed in the paper. Chemical analysis after the final cooling showed that dissociation had occurred to a high degree, thus explaining the vigorous gas evolution observed during melting. The composition containing 15% of Fe_2O_3 was a critical one in the V_2O_5 - Fe_2O_3 system:

Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other complex systems

below this composition vanadium pentoxide dissociated, while above this composition iron oxide decomposed. Decomposition in the V_2O_5 - CuO system was confined mainly to the copper oxide. The temperature dependence of the electrical conductivity of the V_2O_5 - Fe_2O_3 system is illustrated in Fig 1, graphs 1,2 and 3 corresponding to Fe_2O_3 contents of 15, 19.4 and 30.5% respectively. It can be seen that: (a) the conductivity decreased with temperature over the 550-650°C range, except when the iron oxide content was very high; this negative temperature coefficient is attributed to the saturation of those impurity levels to which solid V_2O_5 owes its p-type conductivity; (b) above 650°C the conductivity increased smoothly with temperature, but in some instances a decrease in conductivity was observed in the 800-850°C range. The reason for this behaviour is not understood:

Card 3/7 but according to Martinet (Ref 3) and Grunewald (Ref 4) it can be attributed to the admixture mechanism of

Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other complex systems

conduction by which Fe_2O_3 is characterised. The presence of FeO as a decomposition product was believed to explain why many of the investigated compositions did not display this conductivity decrease; (c) the conductivity increase is accelerated at temperatures of about 900 to 950°C. The weight losses observed at high temperatures with pure V_2O_5, and with the V_2O_5 - rich melts indicated considerable dissociation of V_2O_5 and Fe_2O_3. The decomposition products V_2O_3 and FeO appeared to influence the temperature/conductivity relationships; for most of the alloys the curves for the liquid state are not exponential in character and therefore the activation energies could not be determined. The conductivity isotherms reproduced on Fig 2 indicate an accelerated increase of the electric conductivity at 15% Fe_2O_3. Above this composition conductivity due to Fe_2O_3plays the predominant part.

Card 4/7 For the V_2O_5 - CuO system, the conductivity-temperature relationships of the 10, 20, 30, 40 and 50% CuO alloys

are shown in Fig 3, (graphs 1 to 4 respectively). In this case, the conductivity also decreased with temperature over the 500 to 625°C range, but the decrease was much larger than that observed in the previous system. (The table, p 9, gives the factors by which the electric conductivity of various alloys dropped in this temperature range: for the 30% CuO alloy this factor amounted to 80.) Compositions containing 10 to 35% CuO had a high conductivity which was attributed to an increased transfer of electrons from the copper oxide to those impurity levels which determine the p-type conductivity of solid V_2O_5. The decrease in conductivity observed within this temperature range might have been intensified by the volume changes which according to Lucas et al. (Ref 1), occur when alloys containing up to 35% CuO are heated to 650-700°C. At temperatures higher than 800-850°C the conductivity increased with increasing temperature. This effect is attributed to the presence of the dissociation

Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other Complex Systems

products, mainly Cu_2O. The conductivity isotherms of the V_2O_5 - CuO system reproduced on Fig 4 (graphs 2 to 7) exhibit two sharp maxima at 25 and 60% CuO. The first maximum was observed only at 500-600°C. The second maximum, whose magnitude increased with temperature, is probably due to decomposition of CuO which brings about an increased concentration of the current carriers. The conductivity isotherms of the ternary and quaternary systems are shown on Figs 5 and 6 respectively: in these cases, no decrease in the conductivity with rise of temperature was observed. The experimental findings indicated that all compositions of the two studied quasi-binary systems behave as semi-conductors both in the

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Electrical Conductivity of the Binary Vanadium Pentoxide-Iron Oxide and Vanadium Pentoxide-Copper Oxide Systems, and of some other Complex Systems

solid and in the liquid states.

There are 6 graphs, 3 tables and 13 references, of which 6 are Soviet, 4 English, 2 German and 1 French.

ASSOCIATION: Institut Metallurgii Ural'skogo Filiala AN SSSR (Institute of Metallurgy Ural Branch A.S. USSR)

SUBMITTED: February 14, 1957

Card 7/7

BARMIN, L.N., inzh.; YESIN, O.A., doktor tekhn.nauk, prof.; CHUCHMAREV, S.K., kand.tekhn.nauk, dotsent

Effect of slag composition on the activity of the hydrogen dissolved in it. Izv.vys.ucheb.zav.; chern.met. no.6:65-73 Je '58. (MIRA 12:8)

1. Ural'skiy politekhnicheskiy institut. Rekomendovano kafedroy teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta.
(Slag--Analysis) (Hydrogen) (Activity coefficients)

ZYAZEV, V.L.; YESIN, O.A.

Viscosity and density of the systems V_2O_5-CaO and V_2O_5-MgO. Izv.Sib.otd. AN SSSR no.9:3-9 '58. (MIRA 11:11)

1. Ural'skiy filial Akademii nauk SSSR.
(Vanadium oxides) (Viscosity) (Fusion)

ZYAZEV, V.L.; YESIN, O.A.

Viscosity and density of the systems V_2O_5 - Fe_2O_3, V_2O_5 - CuO and V_2O_5 - CaO - Fe_2O_3. Izv. Sib. otd. AN SSSR no.10:13-20 '58. (MIRA 11:12)

1.Ural'skiy filial AN SSSR.
(Systems (Chemistry)) (Viscosity) (Fusion)

YESIN, O.A.; ZAKHAROV, I.N.

Electrolytic deposition of chromium from fused slags, its valence and the solubility of its oxides. Izv.Sib.otd.AN SSSR no.11:3-8 '58. (MIRA 12:2)

1. Ural'skiy filial AN SSSR.
(Chromium plating)

YESIN, O.A., prof., doktor tekhn.nauk; ZAKHAROV, I.N., inzh.

Solubility of chromium oxide in molten slag in contact with metal.
Izv.vys.ucheb.zav.; chern.met. no.11:45-52 '58. (MIRA 12:1)

1. Ural'skiy politekhnicheskiy institut i Institut metallurgii Ural'skogo filiala AN SSSR. Rekomendovano kafedroy teorii metallurgicheskikh protsessov Ural'skogo politekhnicheskogo instituta.
(Chromium oxides) (Slag) (Electrometallurgy)

YESIN, O. A.

57-1-2/30

AUTHORS: Zyazev, V. L., Yesin, O. A.

TITLE: On the Influence of the Short Range Order on the Character of Conductivity (O vliyanii blizhnego poryadka na kharakter provodimosti).

PERIODICAL: Zhurnal Tekhnicheskoy Fiziki, 1958, Vol. 28, Nr 1, pp. 18-22 (USSR)

ABSTRACT: The authors refer to the works of A. F. Ioffe (reference 1) and Regel' (reference 1). These stated that for the character of the conductivity the short and not long range order of the atoms is of great importance. The measurement results of the electric conductivity of binary alloys of V_2O_5 with PbO, CaO and MgO in various compositions and at various temperatures are given. The measurements were carried out in open resistance furnaces (in the air) with alternating current, 1000 c frequency, usual resistance bridge (as zero instrument served a cathode oscillograph). As V_2O_3 when being cooled oxidizes to V_2O_5 the measurements with the second heating were more reliable and only these results are given here. The authors show that the transition from the

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On the Influence of the Short Range Order on the Character of Conductivity 57-1-2/30

semiconductor mechanism to the ion mechanism in the systems begins with unequal MeO concentrations. In alloys of V_2O_5 with CaO it begins at 23,4 % CaO, in the V_2O_5-MgO-system at 27,7 % MgO and with V_2O_5-PbO at 71 %. PbO. In all cases the transition-begin corresponds with the first chemical compound in the respective system. Such a regularity points out the important part of the short range order in the atomic distribution for the realization of the semiconductor electric conductivity in alloys. The character of the polytherms for the electric conductivity shows that in the V_2O_5-PbO, V_2O_5-CaO and V_2O_5-MgO alloys the semiconductor mechanism passes over to an ion mechanism with compounds which correspond to the chemical compounds with the least second component (MeO). The regularity determined proves the opinion of Ioffe.
There are 4 figures, and 13 references, 6 of which are Slavic.

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On the Influence of the Short Range Order on the Character of Conductivity 57-1-2/30

ASSOCIATION: Institute for Metallurgy of the Ural Branch AN USSR, Sverdlovsk (Institut metallurgii Ural'skogo filiala AN SSSR, Sverdlovsk).

SUBMITTED: March 26, 1957

AVAILABLE: Library of Congress

Card 3/3

MUSIKHIN, V.I.; YESIN, O.A.; LEPINSKIKH, B.M.

Influence of Mn, P and Si on the activity of aluminum in liquid cast iron. Zhur. prikl. khim. v. 31 no.5:689-693 My '58. (MIRA 11:6)

1.Institut metallurgii Ural'skogo filiala AN SSSR.
(Iron-aluminum alloys)

YESIN, O.A.; POPEL', S.I.; BRATCHIKOV, S.G.; RAZUMOV, V.N.; PLOTNIKOV, I.M.

Desulfurization of steel in induction furnaces with the aid of direct current. Zhur.prikl.khim. 31 no.12:1837-1842 D '58. (MIRA 12:2)

(Steel--Metallurgy) (Desulfuration)

76-32-2-18 32

AUTHORS: Yesin, O. A., Chechulin, V. A.

TITLE: Cathode Polarization in the Separation of Silicon, Iron and Sodium From Oxide-Melts (Katodnaya polyarizatsiya pri vydelenii kremniya, zheleza i natriya iz oksidnykh rasplavov)

PERIODICAL: Zhurnal Fizicheskoy Khimii, 1958, Vol. 32, Nr 2, pp. 355-360 (USSR)

ABSTRACT: The cathode polarization in $CaO - Al_2O_3 - MgO$ melts with small additions of SiO_2, $Fe_2O_3 + FeO$ as well as with Na_2O for comparative purposes was investigated. The measurements were carried out at 1400-1500°C according to the commutator method (Reference 2). The cathode polarization η in the separation of sodium, silicon and iron from the oxide melts was measured. It was found that the quantity η does not depend on the electrode material, that it decreases in mixing and that it follows the equation for the concentration polarization. It is shown that in the cases investigated the polarization is dependent on the slowed down diffusion of the

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Cathode Polarization in the Separation of Silicon, Iron and Sodium From Oxide-Melts

sodium ion and of the 3- and 2-valent iron ions in the electrolyte. Summarizing the authors state that the concentration polarization in oxide melts is widely spread. This is connected with the small values of the diffusion coefficients, as the diffusion in them is not greater than in aqueous solutions. The shape of the curves, the mutual position of the element separation potentials and the observed proportionality of the boundary amperages with the concentrations permit to speak of the possibility of a high temperature polarography in oxide melts. There are 4 figures, and 10 references, 8 of which are Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S. M. Kirova, Sverdlovsk (Ural Polytechnical Institute imeni S. M. Kirov, Sverdlovsk)

SUBMITTED: November 3, 1956

1. Cathodes (Electrolytic cell)--Polarization 2. Iron --Separation 3. Silicon--Separation 4. Sodium--Separation 5. Electrolytes--Properties